Best Available Copy

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-151005
(43)Date of publication of application : 24.05.2002

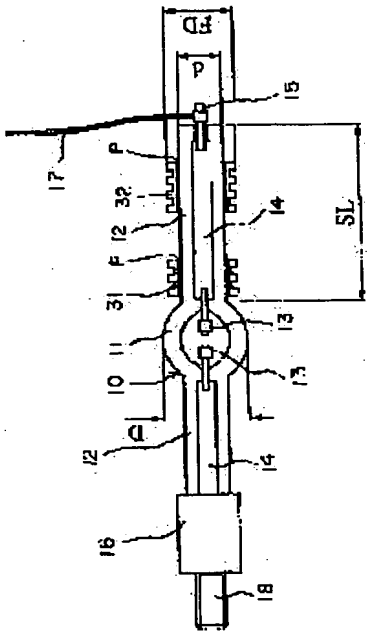
(51)Int.CI. H01J 61/52

(21)Application number : 2000-346125
(22)Date of filing : 14.11.2000

(71)Applicant : USHIO INC
(72)Inventor : KABURAGI KIYOYUKI
TAKEMURA SATORU
MIYAUCHI KOJI
NAKAYAMA KATSUYUKI

(54) DISCHARGE LAMP

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a discharge lamp having a long lamp life-time wherein temperatures of a light emitting tube and a sealing tube part can be reduced and devitrification of the light emitting tube and oxidation of a molybdenum foil can be prevented.
SOLUTION: Heat-discharge fins 31, 32 are arranged and installed in a divided state at a peripheral face of a sealing tube part 12, especially at an end part of the light emitting tube 11 side and an end part of a drawing out side of an external lead rod 15. Further, the heat-discharge fin is molded using a material having a high emissivity in the infrared region, or a coating film having a high emissivity in the infrared region is formed on the surface. Otherwise, the heat-discharge fin is molded by fused quartz and this is welded to the sealing tube part.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号
特開2002－151005
（P2002－151005A）
(43)公開日　平成14年５月24日(2002.5.24)

(51)Int.Cl.[7]	識別記号	ＦＩ	ﾃｰﾏｺｰﾄﾞ(参考)
Ｈ０１Ｊ　61/52		Ｈ０１Ｊ　61/52	Ｂ　５Ｃ０３９

審査請求　未請求　請求項の数４　ＯＬ　（全５頁）

(21)出願番号　特願2000－346125(P2000－346125)

(22)出願日　平成12年11月14日(2000.11.14)

(71)出願人　000102212
ウシオ電機株式会社
東京都千代田区大手町２丁目６番１号　朝日東海ビル19階

(72)発明者　蕪木　清幸
兵庫県姫路市別所町佐土1194番地　ウシオ電機株式会社内

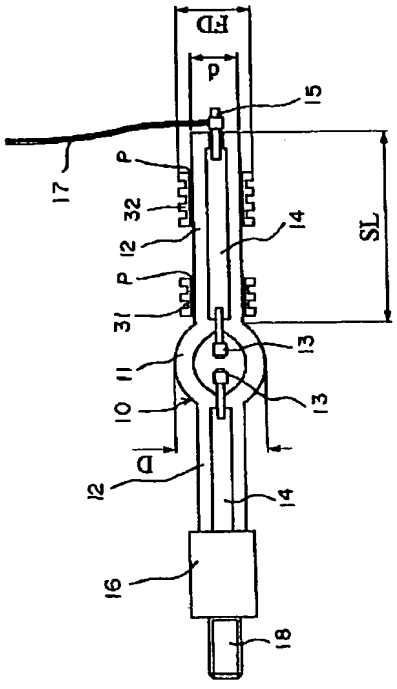
(72)発明者　竹村　哲
兵庫県姫路市別所町佐土1194番地　ウシオ電機株式会社内

(74)代理人　100084113
弁理士　田原　寅之助

最終頁に続く

(54)【発明の名称】　放電ランプ

(57)【要約】
【課題】　発光管および封止管部の温度を低下させることが可能であり、発光管の失透やモリブデン箔の酸化を防止できてランプ寿命が長い放電ランプを提供する。
【解決手段】　放熱フィン３１、３２を封止管部１２の周面、ことに封止管部の発光管１１側端部および外部リード棒１５導出側端部に分割した状態で配設する。また、放熱フィンを赤外域放射率の高い材料で成形し、あるいは表面に赤外域放射率の高い塗膜を形成する。あるいは、放熱フィンを石英ガラスで成形し、これを封止管部に溶着する。



1

【特許請求の範囲】

【請求項１】　石英ガラス製の発光管と該発光管の両側に連設された封止管部を有し、該封止管部に保持された一対の電極が該発光管内で対向配置された放電ランプにおいて、

前記封止管部の周面に放熱フィンを具備したことを特徴とする放電ランプ。

【請求項２】　前記放熱フィンを封止管部の発光管側端部および外部リード棒導出側端部に具備したことを特徴とする請求項１記載の放電ランプ。

【請求項３】　前記放熱フィンの少なくとも表面は石英ガラスよりも高い赤外放射率を有する材料で構成されたことを特徴とする請求項１又は２記載の放電ランプ。

【請求項４】　前記放熱フィンは石英ガラスからなり、該封止管部の周面に溶着されたことを特徴とする請求項１、２又は３記載の放電ランプ。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、液晶プロジェクタ装置やファイバー照明機器などの光源に使用される放電ランプに関する。

【０００２】

【従来の技術】液晶プロジェクタ装置などの光源として使用される放電ランプは、高画質な画像を得るために、高輝度で演色性に優れるショートアーク型の超高圧水銀ランプ、メタルハライドランプ、キセノンランプなどが使用されるが、近年、液晶プロジェクタ装置などの技術進歩は目覚しく、高画質に加えて、装置の小型・軽量化の要請が非常に大きい。

【０００３】このため、凹面反射鏡は開口径が小さくても受光角度が大きくできる短い焦点を持ち、ランプ挿入穴も小さいものが使用される。また、かかる凹面反射鏡と組み合わされる放電ランプも小型であることが必要となり、発光管径が小さくて全長の短い放電ランプが使用される。Ａ５版以下のモバイル型プロジェクター装置では、例えば、開口部の大きさが５０ｍｍ角程度の凹面反射鏡と発光管径が約φ１０ｍｍで全長が７０ｍｍ以下であって１００～１５０Ｗの超高圧水銀ランプが使用される。従って、発光管の管壁負荷が大きくなり、発光管の温度は極めて高くなる。

【０００４】液晶プロジェクタ装置などにおいては、特開平８－２６２５７３号公報に開示されているように、冷却風を凹面反射鏡内に送風して発光管を冷却することが行われるが、冷却風の騒音を小さくするために１～２ｍ／ｓ程度の緩やかな送風が望まれている。また、装置の小型化のために、送風は凹面反射鏡の側面から行われることが多く、十分な冷却効果を得るのが困難になっている。

【０００５】光源ランプとして使用される超高圧水銀ランプ、メタルハライドランプ、キセノンランプは、点灯

2

時には発光管の内圧が４ＭＰａを超す高圧動作になるので、発光管が破壊する恐れがある。このため、凹面反射鏡の開口部近傍に透明な前面ガラスを配置して略密閉構造とし、水銀漏れを防止するとともに破裂音を抑制する機能も兼ねた防爆構造が取られるが、かかる構造においては、凹面反射鏡内に熱がこもり、対流による熱伝達量が少なくなり、発光管の温度が高くなる。

【０００６】このように、液晶プロジェクタ装置の光源ランプとして使用される放電ランプおよび凹面反射鏡は、小型であって防爆構造が採られるので、放電ランプの発光管は温度が極めて高くなる傾向にある。しかし、一般に石英ガラス製の発光管は、その外面が１１００℃以上になると失透して光量減衰が大きくなる。また、発光管に連設された封止管部も高温なるが、封止管部に埋設されたモリブデン箔の温度が４００℃を超えると、モリブデン箔が酸化して電気的な接続が取れなくなり、ランプ寿命が著しく短くなる。

【０００７】封止管部の温度を低下させてモリブデン箔の酸化を防止するために、特開平８－２５００７１号公報には、凹面反射鏡の開口側の口金に放熱フィンを取り付けることが開示されている。この技術は、半導体や液晶の露光用装置に適用されるものであり、これらの露光装置の光源装置は、凹面反射鏡の開口が開放されている大型なものである。このため、室温に近い冷却風を数ｍ／ｓ以上の風速で送風できるので、封止管部の温度を低下させてモリブデン箔の酸化を防止することができる。

【０００８】しかしながら、コンパクト化や低騒音が要求されるＡ５版以下のモバイル型プロジェクタ装置などにおいては、前述のとおり、防爆構造を要し、かつ十分な冷却風を供給できないので、封止管部の端部、つまり封止管部の低温部に取り付けられた口金に放熱フィンを設けたのでは、十分な放熱が期待できず、モリブデン箔の酸化を防止することができない。ましてや、発光管の温度を低下させる効果はほとんど期待できない。

【０００９】

【発明が解決しようとする課題】そこで本発明は、防爆構造であって冷却風を十分に供給できず、かつ発光管のサイズが小さくて管壁負荷が大きいにもかかわらず、発光管および発光管に連設された封止管部の温度を低下させることが可能であり、発光管を構成する石英ガラスの失透やモリブデン箔の酸化を防止できてランプ寿命が長く、高輝度で演色性に優れた放電ランプを提供することを目的とする。

【００１０】

【課題を解決するための手段】かかる目的を達成するため、請求項１の発明は、石英ガラス製の発光管と該発光管の両側に連設された封止管部を有し、封止管部に保持された一対の電極が発光管内で対向配置された放電ランプにおいて、封止管部の周面に放熱フィンを配設する。つまり、封止管部の周面に放熱フィンを配設することに

より、発光管より封止管部に伝達された熱を流体に伝える表面積を数倍大きくできるので冷却能力が大きく、発光管および封止管部の温度を低下させることができる。

【００１１】封止管部の発光管側端部から外部リード棒導出側端部までの全範囲に放熱フィンを配設すると、発光管からの熱がこの放熱フィンを伝導し、低温側である外部リード棒導出側端部に伝達されるので、請求項２の発明のように、放熱フィンを封止管部の発光管側端部および外部リード棒導出側端部に分割した状態で配設するのが好ましい。これにより、発光管からの熱がこの放熱フィンを伝導して低温部である外部リード棒導出側端部に伝達されることがなく、封止管部の高温部および低温部をそれぞれ効率良く冷却することができる。

【００１２】放熱フィンは、７００℃以上の高温部では、Al_2O_3やＭｇＯやＡｌＮなどの熱伝導に優れたセラミックス焼結体、または、ニッケルクロム合金などで成形するのがよく、７００℃未満の低温部においては、銅などの金属で成形し、これらの放熱フィンを接着剤で封止管部に固着する。

【００１３】次に、請求項３の発明のように、放熱フィンを石英ガラスよりも高い赤外放射率の材料で構成したり、放熱フィンの表面を石英ガラスよりも高い赤外放射率の材料で被覆すると、熱の放射率が更に高くなり、効率良く冷却することができる。赤外放射率が高く、かつ石英ガラスとの熱膨張率の差が小さくて熱衝撃性に優れた材料としては、MnO_2、Fe_2O_3、ＣｏＯ、ＣｕＯなどの遷移金属酸化物混合物にβスポジューメン（$Li_2O \cdot Al_2O_3 \cdot 4SiO_2$）またはコージェライト（$2MgO \cdot 2Al_2O_3 \cdot 5SiO_2$）が重量比で２５～７５％生成するようにコージライトやペタライト組成物を混合し、焼結体としたものが知られている。また、赤外放射率の高い被覆材としては、SiO_2とAl_2O_3と$CuCr_2O_4$とからなる混合微粉末や$SiZrO_4 \cdot Mn_2O_3$、$Fe_2O_3 \cdot CoO$などの混合微粉末を挙げることができる。

【００１４】また、放熱フィンを石英ガラス以外の材料で構成して封止管部の周面に接着剤で接着すると、封止管部と放熱フィンの間の熱伝導が幾分阻害されるので、請求項４の発明のように、放熱フィンを石英ガラスで構成し、これを封止管部の周面にガラスフリットなどを介して溶着すると熱伝導が阻害されず、長期に安定して効率的に放熱でき、好ましい。

【００１５】これらの放熱フィンを設けることにより、凹面反射鏡で反射された可視光が屈曲したり、吸収されたりすると光利用効率を損なうので、この観点からは、凹面反射鏡のホール径よりも小さい径で製作するか、径の大きい場合は可視域で透明であって平面状であることが望ましい。

【００１６】

【発明の実施の形態】以下に、図面に基づいて本発明の

実施の形態を具体的に説明する。図１は第１の実施例を示す。図１において、放電ランプ１０は、ランプ入力がＡＣ１３０Ｗの超高圧放電ランプである。石英ガラスからなる略球状の発光管１１の両端に封止管部１２、１２が一体に連設されている。封止管部１２にはモリブデン箔１４が埋設されており、尾端部がモリブデン箔１４にそれぞれ溶接された一対の電極１３、１３が発光管内１１において対向配置されている。また、発光管１１内には所定量の水銀が封入されている。

【００１７】外部リード棒１５がモリブデン箔１４の端部に溶接されて一方の封止管部１２から伸び出し、この外部リード棒１５にリード線１７が接続されている。他方の封止管部１２には、接点１８を有する口金１６が取り付けられており、この封止管部１２が凹面反射鏡のランプ挿入筒部に挿入される。そして、リード線１７と接点１８の間に通電することにより電極１３、１３間でアーク放電が起こり、発光する。

【００１８】この放電ランプ１０の具体的数値例を挙げれば、発光管１１の外径Ｄがφ１０ｍｍ、肉厚が２．５ｍｍ、封止管部１２の外径ｄがφ６ｍｍ、長さＳＬが２５ｍｍである。また、水銀の封入量は０．１５ｍｇ／ｍｍ^3である。

【００１９】リード線１７が接続された封止管部１２の発光管側端部、つまり高温側に第１放熱フィン３１が取り付けられ、封止管部１２の外部リード棒導出側端部、つまり低温側に第２放熱フィン３２が取り付けられている。放熱フィン３１、３２は筒状の軸の外周面に円環状のフィンが設けられたものである。放熱フィン３１、３２は、例えばAl_2O_3の焼結体からなり、表面には$SiZrO_4 \cdot Mn_2O_3$と$Fe_2O_3 \cdot CoO$の混合微粉末の塗膜が塗布されており、赤外域放射率の高いものである。

【００２０】放熱フィン３１、３２の具体的数値例を挙げると、軸径がφ６．５ｍｍ、肉厚が０．８ｍｍ、フィン径ＦＤがφ１０ｍｍ、肉厚が１．０ｍｍ、フィン溝が１．０ｍｍである。そして、フィンの枚数は、高温側の放熱フィン３１が３枚、低温側の放熱フィン３２が４枚である。従って、放熱フィン３１、３２の軸の内周面と封止管部１２の外周面のクリアランスは０．３ｍｍであり、この隙間に無機系の接着剤Ｐを充填して接着している。接着剤Ｐの厚みが１ｍｍ以上であると熱伝導が低下するので、この場合は、熱伝導率の高い接着剤を適宜選択する。

【００２１】かかる放電ランプ１０は、図２に示すように、凹面反射鏡２０と組み合わされる。凹面反射鏡２０は、肉厚が４．５ｍｍの結晶化ガラスで成形されたＦ６放物面鏡であり、前面開口のサイズは□５０ｍｍである。凹面反射鏡２０の背面の頂部にはランプ挿入筒部２１が形成されており、放電ランプ１０の口金１６が取り付けられた側の封止管部１２がランプ挿入筒部２１にさ

5

れ、所定の位置関係で保持されている。そして、反射面２２の表面には、TiO_2+SiO_2からなる可視光反射膜が３７層積層されている。反射面２２の前方には、一対の冷却風通過孔２３が対向して形成されている。この冷却風通過孔２３の面積は約２００mm^2×２である。また、凹面反射鏡２０の前面開口には、防爆・防音用の前面ガラス２４が取り付けられている。

【００２２】しかして、放電ランプ１０を点灯し、凹面反射鏡２０の一方の冷却風通過孔２３から冷却風を風速約数m／ｓで送風し、他方の冷却風通過孔２３から流出させた。そして、発光管１１の上部外面温度を測定したところ、放熱フィンを設けない従来例では１１００℃であったが、この実施例では従来例よりも２０℃以上低下させることができた。従って、点灯時間に対する発光管１１の失透速度が遅くなり、良好な光束維持率を実現できるようになった。また、封止管部１２の外側端部の温度を測定したところ、放熱フィンを設けない従来例では４４０℃であったが、この実施例では従来例よりも４０℃以上低下させることができた。従って、封止管部１２に埋設されたモリブデン箔の高温酸化が抑制され、１０００時間以上のランプ寿命が期待できるようになった。

【００２３】次に、図３は第２の実施例を示す。図３において、放電ランプ１０は、前記の放電ランプと同じ仕様の超高圧放電ランプである。そして、リード線１７が接続された封止管部１２の発光管側端部、つまり高温側に第１放熱フィン３１が取り付けられ、封止管部１２の外部リード棒導出側端部、つまり低温側に第２放熱フィン３２が取り付けられている。放熱フィン３１、３２は筒状の軸の外周面に、図３（B）に示すように、断面形状が台形をなす軸線方向のフィンが設けられたものである。そして、この放熱フィン３１、３２は、焼結石英ガラスにより成形され、その表面には、赤外域放射率の高い、$SiZrO_4$・Mn_2O_3とFe_2O_3・CoOの混合微粉末の塗膜が塗布されている。そして、モリブデン粉末を含んだフリットを介して光加熱により封止管部１２に溶融固着されている。

【００２４】放熱フィン３１、３２の具体的数値例を挙げると、フィン外径がφ９．５mm、フィン溝径がφ７．５mm、フィン数が１２枚、フィンの先端幅が０．７mm、根元幅が１．２mmである。そして、フィンの長さは、放熱フィン３１が５mm、放熱フィン３２が７mmである。

【００２５】この放電ランプ１０を、図２と同様に凹面反射鏡と組み合わせ、前記と同じ冷却し条件で冷却した。そして、発光管１１の上部外面温度を測定したところ、放熱フィンを設けない従来例では１１００℃であったが、この実施例では従来例よりも２５℃以上低下させることができた。従って、この実施例においても、点灯時間に対する発光管１１の失透速度が遅くなり、良好な光束維持率を実現できるようになった。また、封止管部

6

１２の外側端部の温度を測定したところ、放熱フィンを設けない従来例では４４０℃であったが、この実施例では従来例よりも４５℃以上低下させることができた。従って、本実施例においても、封止管部１２に埋設されたモリブデン箔の高温酸化が抑制され、１０００時間以上のランプ寿命が期待できる。そして、この実施例においては、放熱フィン３１、３２が封止管部１２の周面にガラスフリットなどを介して溶着されているので、熱伝導が阻害されず、長期に安定して効率的に放熱することができる。

【００２６】

【発明の効果】以上説明したように、本発明は、放熱フィンを封止管部の周面、ことに封止管部の発光管側端部および外部リード棒導出側端部に分割した状態で配設するので、発光管より封止管部に伝達された熱を流体に伝える表面積を数倍大きくできて冷却能力が大きく、従って、防爆構造であって冷却風を十分に供給できず、かつ発光管のサイズが小さくて管壁負荷が大きいにもかかわらず、発光管および封止管部の温度を低下させることができる。このため、発光管を構成する石英ガラスの失透やモリブデン箔の酸化を防止できてランプ寿命が長く、高輝度で演色性に優れた放電ランプとすることができる。また、放熱フィンを赤外域放射率の高い材料で成形し、あるいは表面に赤外域放射率の高い塗膜を形成することにより、更に優れた効果を得ることができる。あるいは、放熱フィンを石英ガラスで成形し、これを封止管部に溶着すると、熱伝導が阻害されず、長期に安定して効率的に放熱することができる。

【図面の簡単な説明】

【図１】本発明の第１実施例の説明図である。

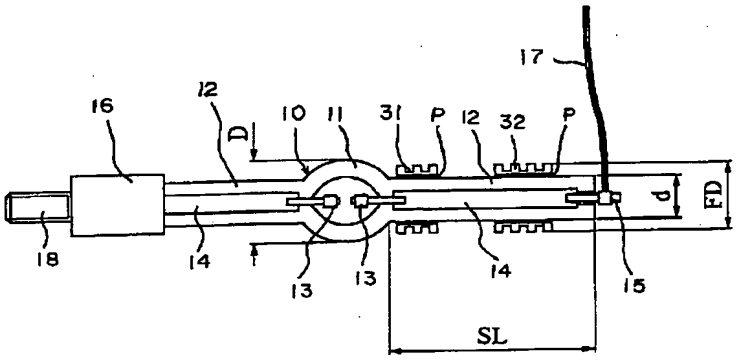
【図２】放電ランプを凹面反射鏡と組み合わせた状態の説明図である。

【図３】本発明の第２実施例の説明図である。

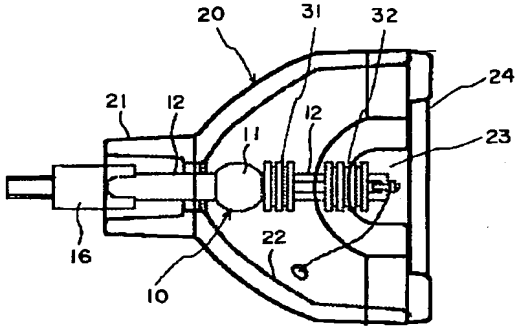
【符号の説明】

１０　放電ランプ
１１　発光管
１２　封止管部
１３　電極
１４　モリブデン箔
１５　外部リード棒
１６　口金
１７　リード線
１８　接点
２０　凹面反射鏡
２１　ランプ挿入筒部
２２　反射面
２３　冷却風通過孔
２４　前面ガラス
３１　第１放熱フィン
３２　第２放熱フィン

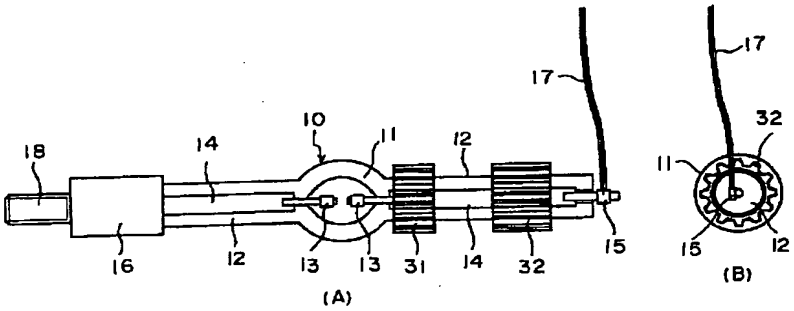
【図１】



【図２】



【図３】



フロントページの続き

(72)発明者　宮宇地　浩二
兵庫県姫路市別所町佐土1194番地　ウシオ電機株式会社内

(72)発明者　中山　勝之
兵庫県姫路市別所町佐土1194番地　ウシオ電機株式会社内

Fターム(参考)　5C039 AA01 AA02 AA03 AA13

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-151005
(43)Date of publication of application : 24.05.2002

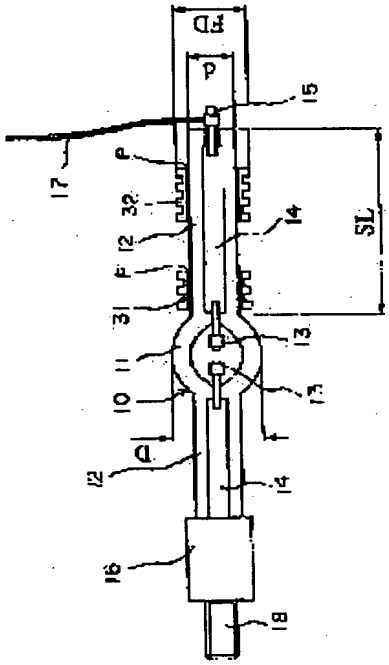
(51)Int.Cl. H01J 61/52

(21)Application number : 2000-346125
(22)Date of filing : 14.11.2000

(71)Applicant : USHIO INC
(72)Inventor : KABURAGI KIYOYUKI
TAKEMURA SATORU
MIYAUCHI KOJI
NAKAYAMA KATSUYUKI

(54) DISCHARGE LAMP

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a discharge lamp having a long lamp life-time wherein temperatures of a light emitting tube and a sealing tube part can be reduced and devitrification of the light emitting tube and oxidation of a molybdenum foil can be prevented.
SOLUTION: Heat-discharge fins 31, 32 are arranged and installed in a divided state at a peripheral face of a sealing tube part 12, especially at an end part of the light emitting tube 11 side and an end part of a drawing out side of an external lead rod 15. Further, the heat-discharge fin is molded using a material having a high emissivity in the infrared region, or a coating film having a high emissivity in the infrared region is formed on the surface. Otherwise, the heat-discharge fin is molded by fused quartz and this is welded to the sealing tube part.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The discharge lamp with which the electrode of the pair which has the closure tube part formed successively by the both sides of the arc tube made from quartz glass and this arc tube, and was held at this closure tube part is characterized by providing a radiation fin in the peripheral surface of said closure tube part within [this] luminescence in the discharge lamp by which opposite arrangement was carried out.
[Claim 2] The discharge lamp according to claim 1 characterized by providing said radiation fin in the luminescence tubeside edge of a closure tube part, and the external lead rod derivation side edge section.
[Claim 3] It is the discharge lamp according to claim 1 or 2 characterized by consisting of ingredients which have the rate of infrared radiation with a front face higher than quartz glass of said radiation fin at least.
[Claim 4] Said radiation fin is a discharge lamp according to claim 1, 2, or 3 characterized by having consisted of quartz glass and carrying out joining to the peripheral surface of this closure tube part.

[Translation done.]

* NOTICES *

JPO and NCIPI are not responsible for any damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the discharge lamp used for the light source of liquid crystal projector equipment, a fiber lighting device, etc.
[0002]
[Description of the Prior Art] Although the extra-high pressure mercury lamp of the short arc mold which is excellent in color rendering properties with high brightness, a metal halide lamp, a xenon lamp, etc. are used in order that the discharge lamp used as the light source of liquid crystal projector equipment etc. may obtain a high definition image, technical progress, such as liquid crystal projector equipment, is remarkable, and, in addition to high definition, its request of small and lightweight-izing of equipment is very large in recent years.
[0003] For this reason, the lieberkuhn has the short focus which can do a light-receiving include angle greatly, even if the diameter of opening is small, and what also has a small lamp insertion hole is used. Moreover, it is needed that the discharge lamp combined with this lieberkuhn is also small, and a discharge lamp with a small luminescence tube diameter and a short overall length is used. With the mobile mold projector equipment below the A5 version, the lieberkuhn and luminescence tube diameter whose magnitude of opening is 50mm angle extent is [an overall length] 70mm or less in abbreviation phi10mm, and the extra-high pressure mercury lamp of 100-150W is used, for example. Therefore, the buld wall loading of an arc tube becomes large, and the temperature of an arc tube becomes very high.
[0004] In liquid crystal projector equipment etc., ventilating concave surface reflective Keidai in a cooling wind, and cooling an arc tube is performed as indicated by JP,8-262573,A, but in order to make the noise of the cooling style small, loose ventilation of 1 - 2 m/s extent is desired. Moreover, ventilation is performed from the side face of the lieberkuhn in many cases for the miniaturization of equipment, and it is difficult to acquire sufficient cooling effect.
[0005] Since the extra-high pressure mercury lamp used as a light source lamp, a metal halide lamp, and a xenon lamp become the high-pressure actuation in which the internal pressure of an arc tube exceeds 4MPa (s) at the time of lighting, they have a possibility that an arc tube may break. For this reason, although the explosion-proof construction which served also as the function which controls an explosive sound is taken while arranging a transparent front windshield near the opening of the lieberkuhn, considering as abbreviation sealing structure and preventing mercury leakage, in this structure, concave surface reflective Keidai is filled with heat, the amount of heat transfers by the convection current decreases, and the temperature of an arc tube becomes high.
[0006] Thus, since it is small and an explosion-proof construction is taken, the discharge lamp and lieberkuhn which are used as a light source lamp of liquid crystal projector equipment have the arc tube of a discharge lamp in the inclination for temperature to become very high. However, generally, the arc tube made from quartz glass will be devitrified if the external surface becomes 1100 degrees C or more, and quantity of light attenuation becomes large. Moreover, also in the closure tube part formed successively by the arc tube, if the temperature of the molybdenum foil with which elevated-temperature **** was laid under the closure tube part exceeds 400 degrees C, a molybdenum foil will oxidize, it will become impossible to take electric connection, and a lamp life will become remarkably short.
[0007] In order to reduce the temperature of a closure tube part and to prevent oxidation of a molybdenum foil, attaching a radiation fin in the mouthpiece by the side of opening of the lieberkuhn is indicated by JP,8-250071,A. This technique is applied to the equipment for exposure of a semi-conductor or liquid crystal, and the light equipment of these aligners is a large-sized thing by which opening of the lieberkuhn is opened

wide. For this reason, since the cooling wind near a room temperature can be ventilated at a wind speed several m [/s] or more, the temperature of a closure tube part can be reduced and oxidation of a molybdenum foil can be prevented.
[0008] However, in the mobile mold projector equipment below the A5 version with which miniaturization and the low noise are demanded etc., since an explosion-proof construction is required and sufficient cooling wind cannot be supplied as above-mentioned, heat dissipation sufficient in having prepared the radiation fin for the mouthpiece attached in the edge of a closure tube part, i.e., the low-temperature section of a closure tube part, cannot be expected, and oxidation of a molybdenum foil cannot be prevented. Furthermore, the effectiveness of reducing the temperature of an arc tube is hardly expectable.
[0009]
[Problem(s) to be Solved by the Invention] Then, it is possible to reduce the temperature of the closure tube part formed successively by the arc tube and the arc tube, although this invention is an explosion-proof construction and cannot fully supply a cooling wind, and the size of an arc tube is small and buld wall loading is large, the devitrification of quartz glass and the oxidation of a molybdenum foil which constitute an arc tube can be prevented, it is long and a lamp life aims at offering the discharge lamp which was excellent in color rendering properties with high brightness.
[0010]
[Means for Solving the Problem] In order to attain this purpose, invention of claim 1 has the closure tube part formed successively by the both sides of the arc tube made from quartz glass, and this arc tube, and the electrode of the pair held at the closure tube part arranges a radiation fin in the peripheral surface of a closure tube part within luminescence in the discharge lamp by which opposite arrangement was carried out. That is, by arranging a radiation fin in the peripheral surface of a closure tube part, since surface area which tells the heat transmitted to the closure tube part from the arc tube to a fluid can be enlarged several times, refrigeration capacity is large and is made [reducing the temperature of an arc tube and a closure tube part, or].
[0011] If a radiation fin is arranged in all the range from the luminescence tubeside edge of a closure tube part to the external lead rod derivation side edge section, since the heat from an arc tube will conduct this radiation fin and will be transmitted to the external lead rod derivation side edge section which is a low temperature side, it is desirable to arrange like invention of claim 2, where a radiation fin is divided into the luminescence tubeside edge of a closure tube part and the external lead rod derivation side edge section. By this, the heat from an arc tube conducts this radiation fin, it is not transmitted to the external lead rod derivation side edge section which is the low-temperature section, and the elevated-temperature section and the low-temperature section of a closure tube part can be cooled efficiently, respectively.
[0012] A radiation fin is good to fabricate in the elevated-temperature section 700 degrees C or more with the ceramic sintering object excellent in heat conduction, such as aluminum 2O3, MgO, and AlN, or a nickel chrome alloy, it fabricates it with metals, such as copper, in the less than 700-degree C low-temperature section, and it fixes these radiation fins to a closure tube part with adhesives.
[0013] Next, if a radiation fin is constituted from an ingredient of the rate of infrared radiation higher than quartz glass or the front face of a radiation fin is covered with the ingredient of the rate of infrared radiation higher than quartz glass like invention of claim 3, the emissivity of heat becomes still higher and can cool efficiently. As an ingredient which the rate of infrared radiation was high, and whose difference of coefficient of thermal expansion with quartz glass was small, and was excellent in thermal shock nature MnO2, Fe2O3, CoO, A cordylite and a petalite constituent are mixed so that beta spodumene (Li2 O-aluminum2O3 and 4SiO2) or cordierite (2MgO, 2aluminum2O3, and 5SiO2) may generate 25 to 75% by the weight ratio into transition-metals oxide mixture, such as CuO. What was used as the sintering object is known. Moreover, as a cladding material with the high rate of infrared radiation, mixed impalpable powder, such as SiZrO4 and Mn 2O3, and Fe2O3, CoO, can be mentioned. [the mixed impalpable powder which consists of SiO2, aluminum 2O3, and CuCr 2O4, and]
[0014] Moreover, if a radiation fin is constituted from ingredients other than quartz glass and the peripheral surface of a closure tube part is pasted with adhesives, since heat conduction between a closure tube part and a radiation fin will be checked a little, if a radiation fin is constituted from quartz glass and this is welded [of a closure tube part] through a glass frit etc. like invention of claim 4, heat conduction will not be checked, but it is stabilized at a long period of time, heat can be radiated efficiently, and it is desirable.
[0015] Since efficiency for light utilization will be spoiled if the light reflected by the lieberkuhn by preparing these radiation fins is crooked or it is absorbed, from this viewpoint, it manufactures with a path smaller than the diameter of a hole of the lieberkuhn, or when a path is large, it is transparent in a visible

region and it is desirable that it is a plane.

[0016]

[Embodiment of the Invention] Below, based on a drawing, the gestalt of operation of this invention is explained concretely. Drawing 1 shows the 1st example. In drawing 1 , a discharge lamp 10 is an extra-high voltage discharge lamp whose ramp input is AC130W. abbreviation which consists of quartz glass -- the closure tube parts 12 and 12 are formed successively by the both ends of the spherical arc tube 11 at one. The molybdenum foil 14 is laid under the closure tube part 12, and opposite arrangement of the electrodes 13 and 13 of a pair with which the tail edge section was welded to the molybdenum foil 14, respectively is carried out in a luminescence within the pipe one 11. Moreover, the mercury of the specified quantity is enclosed in the arc tube 11.

[0017] The external lead rod 15 is welded to the edge of the molybdenum foil 14, it begins to be extended from one closure tube part 12, and lead wire 17 is connected to this external lead rod 15. The mouthpiece 16 which has a contact 18 is attached in the closure tube part 12 of another side, and this closure tube part 12 is inserted in the lamp insertion cylinder part of the lieberkuhn. And arc discharge happens and emits light between an electrode 13 and 13 by energizing between lead wire 17 and a contact 18.

[0018] If the example of a concrete numeric value of this discharge lamp 10 is given, the outer diameter of dphi6mm of 2.5mm and the closure tube part 12 and die-length SL will be Dphi10mm in outer diameter of an arc tube 11, and thickness will be 25mm. Moreover, the 0.15mg /of the amounts of enclosure of mercury is [mm] 3.

[0019] The 1st radiation fin 31 is attached in a luminescence tubeside edge [of the closure tube part 12 to which lead wire 17 was connected], i.e., elevated temperature, side, and the 2nd radiation fin 32 is attached in the external lead rod derivation side edge section [of the closure tube part 12], i.e., low temperature, side. A circular ring-like fin is prepared in the peripheral face of a shaft tubed in radiation fins 31 and 32. It consists of a sintering object of aluminum 2O3, the paint film of SiZrO4 and Mn 2O3, Fe2O3, and the mixed impalpable powder of CoO is applied to the front face, and the infrared region emissivity of radiation fins 31 and 32 is high.

[0020] When the example of a concrete numeric value of radiation fins 31 and 32 is given, for 0.8mm and the diameter FD of a fin, phi10mm and thickness are [a shaft diameter / phi6.5mm and thickness / 1.0mm and a fin slot] 1.0mm. And the number of the radiation fins 32 by the side of three sheets and low temperature is [the radiation fin 31 by the side of an elevated temperature of the number of sheets of a fin] four. Therefore, the path clearance of the inner skin of the shaft of radiation fins 31 and 32 and the peripheral face of the closure tube part 12 is 0.3mm, filled up this clearance with the adhesives P of an inorganic system, and is pasted up. Since heat conduction falls that the thickness of Adhesives P is 1mm or more, adhesives with high thermal conductivity are chosen suitably in this case.

[0021] This discharge lamp 10 is combined with the lieberkuhn 20 as shown in drawing 2 . The lieberkuhn 20 is F6 parabolic mirror fabricated by the glass ceramics whose thickness is 4.5mm, and the size of front opening is **50mm. The lamp insertion cylinder part 21 is formed in the crowning of the tooth back of the lieberkuhn 20, and the closure tube part 12 of the side in which the mouthpiece 16 of a discharge lamp 10 was attached is used as the lamp insertion cylinder part 21, and is held by position relation. And the 37-layer laminating of the light reflective film which consists of TiO2+SiO<SUB>2 is carried out to the front face of a reflector 22. Ahead of a reflector 22, the passage hole 23 of the cooling style of a pair counters, and it is formed. The area of this passage hole 23 of the cooling style is 2x2 about 200mm. Moreover, the front windshield 24 explosion protection and for sound isolation is attached in front opening of the lieberkuhn 20.

[0022] A deer is carried out, a discharge lamp 10 is turned on, it ventilated by wind-speed divisor m/s, and one passage hole 23 of the cooling style of the lieberkuhn 20 to the cooling wind was made to flow out of the passage hole 23 of the cooling style of another side. And although it was 1100 degrees C in the conventional example which does not prepare a radiation fin when the up external surface temperature of an arc tube 11 was measured, it was able to be made to fall by 20 degrees C or more rather than the conventional example in this example. Therefore, the devitrification rate of the arc tube 11 to lighting time amount becomes slow, and a good lumen maintenance factor can be realized now. Moreover, although it was 440 degrees C in the conventional example which does not prepare a radiation fin when the temperature of the outside edge of the closure tube part 12 was measured, it was able to be made to fall by 40 degrees C or more rather than the conventional example in this example. Therefore, the high temperature oxidation of the molybdenum foil laid under the closure tube part 12 is controlled, and the lamp life of 1000 hours or more can be expected now.

[0023] Next, drawing 3 shows the 2nd example. In drawing 3 , a discharge lamp 10 is an extra-high voltage

discharge lamp of the same specification as the aforementioned discharge lamp. And the 1st radiation fin 31 is attached in a luminescence tubeside edge [of the closure tube part 12 to which lead wire 17 was connected], i.e., elevated temperature, side, and the 2nd radiation fin 32 is attached in the external lead rod derivation side edge section [of the closure tube part 12], i.e., low temperature, side. As shown in drawing 3 (B), the fin of the direction of an axis where a cross-section configuration makes a trapezoid is prepared in the peripheral face of a shaft tubed in radiation fins 31 and 32. And these radiation fins 31 and 32 are fabricated with sintering quartz glass, and the paint film of SiZrO4 and Mn 2O3, Fe2O3, and the mixed impalpable powder of CoO with high infrared region emissivity is applied to that front face. And melting fixing is carried out by optical heating through the frit containing molybdenum powder at the closure tube part 12.

[0024] When the example of a concrete numeric value of radiation fins 31 and 32 is given, for phi7.5mm and the number of fins, 12 sheets and the tip width of face of a fin are [a fin outer diameter / phi9.5mm and a fin groove diameter / 0.7mm and root width of face] 1.2mm. And a radiation fin 31 is [5mm and the radiation fin 32 of the die length of a fin] 7mm.

[0025] this discharge lamp 10 is combined with the lieberkuhn like drawing 2 , and the same as the above -- it cooled and cooled on conditions. And although it was 1100 degrees C in the conventional example which does not prepare a radiation fin when the up external surface temperature of an arc tube 11 was measured, it was able to be made to fall by 25 degrees C or more rather than the conventional example in this example. Therefore, also in this example, the devitrification rate of the arc tube 11 to lighting time amount becomes slow, and a good lumen maintenance factor can be realized now. Moreover, although it was 440 degrees C in the conventional example which does not prepare a radiation fin when the temperature of the outside edge of the closure tube part 12 was measured, it was able to be made to fall by 45 degrees C or more rather than the conventional example in this example. Therefore, also in this example, the high temperature oxidation of the molybdenum foil laid under the closure tube part 12 is controlled, and the lamp life of 1000 hours or more can be expected. And in this example, since joining of the radiation fins 31 and 32 is carried out to the peripheral surface of the closure tube part 12 through the glass frit etc., heat conduction cannot be checked, but it can be stabilized at a long period of time, and heat can be radiated efficiently.

[0026]

[Effect of the Invention] Since this invention arranges a radiation fin in the peripheral surface of a closure tube part, and the condition of having divided into the luminescence tubeside edge of a closure tube part, and the external lead rod derivation side edge section especially as explained above Although it is an explosion-proof construction and a cooling wind cannot fully be supplied, and surface area which tells the heat transmitted to the closure tube part to a fluid can be enlarged several times, and refrigeration capacity is large, therefore buld wall loading is [the size of an arc tube is small and] larger than an arc tube It can do [reducing the temperature of an arc tube and a closure tube part, or]. For this reason, the devitrification of quartz glass and the oxidation of a molybdenum foil which constitute an arc tube can be prevented, and a lamp life is long and it can do [considering as the discharge lamp which was excellent in color rendering properties with high brightness, or]. Moreover, the further excellent effectiveness can be acquired by fabricating a radiation fin with an ingredient with high infrared region emissivity, or forming a paint film with high infrared region emissivity in a front face. Or if a radiation fin is fabricated with quartz glass and this is closure welded, heat conduction cannot be checked, but it can be stabilized at a long period of time, and heat can be radiated efficiently.

[Translation done.]

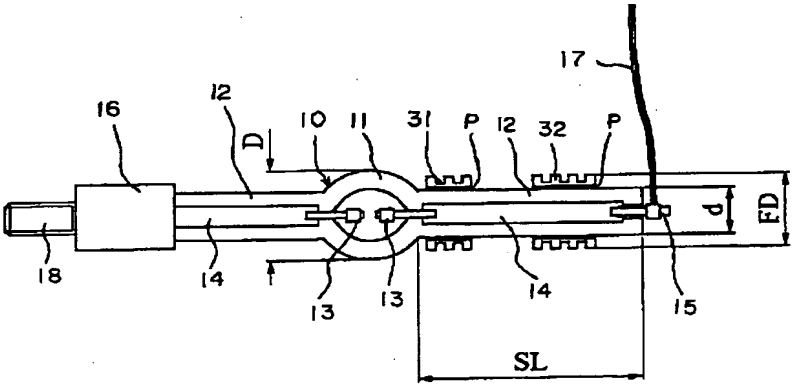
* NOTICES *

JPO and NCIPI are not responsible for any
damages caused by the use of this translation.

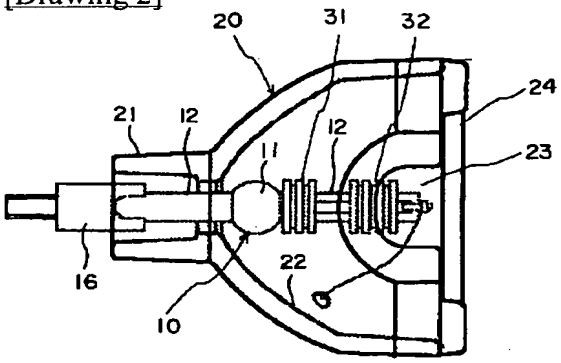
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

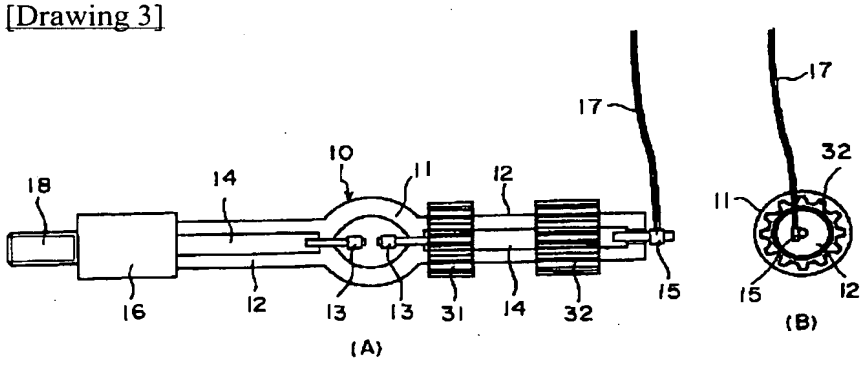
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

This Page is Inserted by IFW Indexing and Scanning Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☑ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.
As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.